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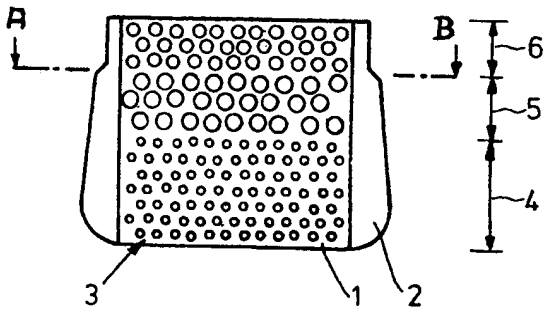
(71) Anmelder: BAYER AG, Zentralbereich Patente, Marken und Lizenzen, D-5090 Leverkusen 1, Bayerwerk (DE)

(72) Erfinder: Samaritter, Reinhard, Fichtestrasse 33, D-5090 Leverkusen 1 (DE)

(54) Formverschäumtes Polsterkissen.

(57) Um im Formverschäumungsverfahren herstellbare Polsterkissen mit optimaler Bequemlichkeit und Beanspruchungsfähigkeit zu erhalten, wird ihre Eindruckhärte den Anforderungen dadurch angepaßt, daß das Kissen (1) und darauf angeordnete Erhebungen (7) aus einem Stück bestehen und daß Gruppen (4, 5, 6) mit Erhebungen (7) unterschiedlicher Geometrie vorhanden sind.



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BAYER AKTIENGESELLSCHAFT
Zentralbereich
Patente, Marken und Lizenzen

5090 Leverkusen, Bayerwerk
Mr/RBg
18. Juni 1979

Formverschäumtes Polsterkissen

Die Erfindung richtet sich auf ein formverschäumtes Polsterkissen, dessen Oberfläche Erhebungen in Form von Zylindern, Kegeln, Kegelstümpfen, Pyramiden, Pyramidenstümpfen, Kugelkalotten, Quadern, Prismen, Rippen und dergleichen aufweist.

Derartige Polsterkissen dienen dem Einsatz im Möbelbereich und vor allen Dingen auch im Fahrzeugsektor.

Zum Erzielen einer bequemen und körpergerechten Polsterqualität ist die Wahl der richtigen Eindrückhärte-Charakteristik von entscheidender Bedeutung.

Man hat deshalb versucht, Blockschaumzuschnitte mit verschiedener Stauchhärte zusammenzukleben. Eine andere Lösung bestand darin, vorgefertigte Formteile einzuschäumen bzw. zu umschäumen.

Eine weitere bekannte Möglichkeit ist das Ausarbeiten voneinander getrennter Aussparungen, wobei durch Verminderung des tragenden Schaumstoffvolumens eine Verringerung der Härte in Teilbereichen von Polsterelementen erreicht wurde.

Schließlich ist es auch schon bekannt, bei Herstellung von Polsterkissen durch Formverschäumen die zu belasten-

de Oberfläche (Sitzfläche, Lehne) mit angeformten Erhebungen gleicher Gestaltung und Größe auszustatten.

Die erstgenannten Herstellungsverfahren sind umständlich und lohnintensiv. Das zuletzt genannte Verfahren ist wesentlich rationeller; eine optimale Anpassung an den menschlichen Körper ist dabei keineswegs gegeben. Es treten bei den vorgenannten Polsterkissen unter Belastung immer Eindrückverformungen auf, d. h., zusätzlich zu den direkt belasteten Flächen - z. B. bei Automobilsitzen durch die Oberschenkel des Passagiers - werden auch die nicht belasteten Nachbarbereiche durch seitlich knickende Zugspannungen verformt. Damit ist die Einstellung der gewünschten lokalen Unterschiede in der Härte nicht möglich.

Die Aufgabe der Erfindung besteht darin, daß ein Polsterkissen gefunden wird, das eine körpergerechte und beanspruchungsgerecht optimale Eindrückhärte-Charakteristik aufweist.

Dies wird erfindungsgemäß dadurch erreicht, daß

a) die Erhebungen mit dem eigentlichen Kissen aus einem Stück bestehen und

b) Gruppen von Erhebungen unterschiedlicher Geometrie vorhanden sind.

Dadurch wird erreicht, daß die Erhebungen gleichzeitig mit dem Polsterkissen beim Formschäumvorgang angeschäumt werden können und daß beispielsweise bei Sitzflächen im Bereich des Gesäßes Erhebungen anderer Geometrie vorgesehen werden können als im Bereich der weniger belastenden Oberschenkel. Die Erhebungen können, wie oben angegeben, die unterschiedlichsten Gestaltungen aufweisen. Von besonderem Einfluß sind auch Größe und Höhe.

Zur Herstellung des formverschäumten Polsterkissens verwendet man ein Reaktionssystem, das beispielsweise Polyurethanschaumstoff hoher Eindrückhärte bildet. Die weicher einzustellenden Bereiche des Polsterkissens erhält man durch die entsprechende Dimensionierung der Noppen. Es lassen sich auf diese Weise Polsterkissen mit zunehmend unterschiedlicher Härte herstellen, bei denen der Übergang von einem Härtegrad zum anderen nahezu stufenlos eingestellt werden kann.

Weitere Vorteile des erfindungsgemäßen Polsterkissens sind darin zu sehen, daß man die Erhebungen nach Anbringen des Bezuges nicht mehr sieht und daß auch im belasteten Zustand infolge der zwischen den Erhebungen vorhandenen Freiräume eine erhebliche Verbesserung des klimatischen Sitzkomforts gegeben ist.

In einer Zeichnung ist das erfindungsgemäße Polsterkissen am Beispiel eines Automobilsitzes dargestellt und nachstehend näher erläutert. Es zeigen:

Fig. 1 das Kissen in der Draufsicht und

Fig. 2 das Kissen im Schnitt gemäß Linie A-B in Fig. 1.

Das Polsterkissen 1 weist Seitenverstärkungen 2 auf, zwischen denen sich die eigentliche Sitzfläche 3 erstreckt. Diese Sitzfläche 3 ist mit drei Gruppen 4, 5, 6 von zylinderstumpfartigen Erhebungen 7 unterschiedlicher Größe und Höhe bedeckt.

Patentanspruch

Formverschäumtes Polsterkissen, dessen Oberfläche Erhebungen in Form von Zylinderstümpfen, Kegeln, Kegelstümpfen, Pyramiden, Pyramidenstümpfen, Kugelkalotten, Quadern, Prismen, Rippen aufweist, dadurch gekennzeichnet, daß

a) die Erhebungen (7) mit dem eigentlichen Kissen (1) aus einem Stück bestehen und

b) Gruppen (4, 5, 6) von Erhebungen (7) unterschiedlicher Geometrie vorhanden sind.

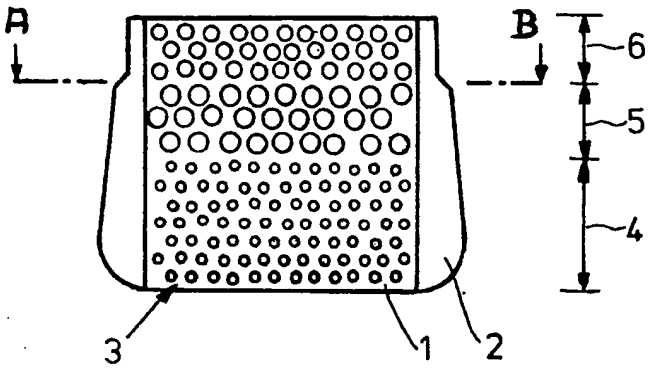

FIG. 1

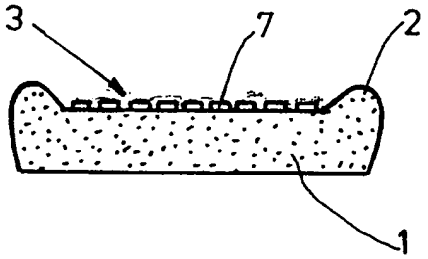

FIG. 2

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(54) **Polsterkissen aus Kunststoff.**

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DE - A - 2 837 630
FR - A - 2 131 448
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(73) Patentinhaber : **BAYER AG**
Zentralbereich Patente, Marken und Lizenzen
D-5090 Leverkusen 1, Bayerwerk (DE)

(72) Erfinder : **Samaritter, Reinhard**
Fichtestrasse 33
D-5090 Leverkusen 1 (DE)

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Imprimerie Jouve, 18, rue St-Denis, 75001 Paris, France

Polsterkissen aus Kunststoff

Die Erfindung richtet sich auf ein Polsterkissen aus Kunststoff für Sitzmöbel und Fahrzeugsitze, dessen Belastungsfläche Erhebungen unterschiedlicher Geometrie aufweist, zwischen denen Freiräume vorhanden sind, wobei die Erhebungen mit einer ihnen gemeinsamen Tragplatte aus gleichem Material ein Stück bilden.

Derartige Polsterkissen dienen dem Einsatz vornehmlich im Möbelbereich, wie sie z.B. aus FR-A-2131448 bekannt sind.

Zum Erzielen einer bequemen und körpergerechten Polsterqualität ist die Wahl der richtigen Eindrückhärte-Charakteristik von entscheidender Bedeutung.

Man hat deshalb versucht, Blockschaumzuschnitte mit verschiedener Stauchhärte zusammenzukleben. Eine andere Lösung bestand darin, vorgefertigte Formteile einzuschäumen bzw. zu umschäumen.

Eine weitere bekannte Möglichkeit ist das Ausarbeiten voneinander getrennter Aussparungen, wobei durch Verminderung des tragenden Schaumstoffvolumens eine Verringerung der Härte in Teilbereichen von Polsterelementen erreicht wurde.

Aus FR-A-2 131 448 ist ein Arbeitsstuhl bekannt, dessen Sitzkissen aus einer relativ dünnen Tragplatte mit elastischen Erhebungen, die gegebenenfalls auf beiden Seiten angeordnet sind, besteht. Als Material für das Sitzkissen ist Gummi, Kunststoff oder ein anderes Elastomer vorgesehen. Die Erhebingen haben die Form kleiner und großer Pilze. Sie können gleichmäßig oder auch ungleichmäßig verteilt sein. Für den Benutzer des Sitzkissens bilden die Pilze die tragenden, Komfort spendenden Elemente, während die Tragplatte im vesentlichen nur als Träger für dir Pilze dient. Eine solche Konstruktion läßt sich nur aus ungeschäumtem Material herstellen, weil bei Verwendung von geschäumtem Material die relativ empfindlichen Stiele der Pilze durch die unvermeidlichen Querbeanspruchungen schnell abreißen würden. Insbesondere besteht durch die Pilzform der Erhebungen die Gefahr, daß Falten der Kleidungsstücke des Benutzers zwischen den Pilzköpfen eingeklemmt werden. Schießlich ist dieses Sitzkissen für Automobilsitze ungeeignet, weil es bei den starken dynamischen Beanspruchungen während der Fahrt ein zu hartes Sitzgefühl vermitteln würde.

Weiterhin ist auch schon vorgeschlagen worden, bei Herstellung von Polsterkissen durch Formverschäumen die zu belastende Oberfläche (Sitzfläche, Lehne) mit angeformten Erhebungen unterschiedlicher Gestaltung und Größe auszustatten.

Der Anmelder hat sich unter Bezugnahme auf das nicht vorveröffentlichte Dokument DE-A-2 837 630 freiwillig eingeschränkt und einen besonderten Patentanspruch für die Bundesrepublik Deutschland vorgelegt.

In dem Dokument DE-A-2 837 630 ist das Schutzbegehren auf einen Arbeitsstuhl mit Sitz und Rückenlehne gerichtet, wobei Sitz und Rückenlehne jeweils einstückig aus elastisch nachgiebigem Kunstschaumstoff anatomisch angepaßt geformt und auf ihrer Sitzfläche bzw. Anlehnfläche jeweils mindestens teilweise mit flachen Noppen versehen sind. Dabei sind vorzugsweise im worderen Bereich der Sitzfläche, wo die Oberschenkel des Sitzenden aufliegen, kleinere Noppen, dichter als im mittleren Bereich der Sitzfläche, vorgesehen. Eine Anwendung dieses Polsterkissens für Fahrzeugsitze wird in dem Dokument nicht gelehrt.

Die Aufgabe ist darin zu sehen, ein Polsterkissen für Sitzmöbel, aber insbesondere für Fahrzeugsitze, zu finden, das hohen Sitzkomfort durch eine körpergerechte und beanspruchungsgerechte optimale Eindrückhärte-Charakteristik gewährleistet, wobei die Erhebungen des Polsterkissens auch starken Querbeanspruchungen standhalten.

Die Lösung der Aufgabe besteht darin, daß das Material formverschäumt ist ; daß die Tragplatte das eigentliche Polsterkissen darstellt ; daß die Höhe der Erhebungen im Verhältnis zur Höhe dieses Polsterkissens gering ist und daß die Verteilung der Erhebungen unterschiedlicher Geometrie den unterschiedlichen Belastungszonen des Polsterkissens entspricht.

Dadurch wird erreicht, daß die Erhebungen gleichzeitig mit dem eigentlichen Polsterkissen beim Formschäumvorgang angeschäumt werden können und daß beispielsweise bei Sitzflächen im Bereich des Gesäßes Erhebungen anderer Geometrie vorgesehen werden können als im Bereich der weniger belastenden Oberschenkel. Die Erhebungen können die unterschiedlichsten Gestaltungen aufweisen, wie Zylinderstümpfe, Kegel, Kegelstümpfe, Pyramiden, Pyramidenstümpfe, Kugelkalotten, Quader, Prismen, Rippen. Von besonderem Einfluß sind auch Größe und Höhe.

Zur Herstellung des formverschäumtem Polsterkissens verwendet man ein Reaktionssystem, das beispielsweise Polyurethanschaumstoff hoher Eindrückhärte bildet. Die weicher einzustellenden Bereiche des Polsterkissens erhält man durch die entsprechende Dimensionierung der Erhebungen. Es lassen sich auf diese Weise Polsterkissen mit zunehmend unterschiedlicher Härte herstellen, bei denen der Übergang von einem Härtegrad zum anderen nahezu stufenlos eingestellt werden kann.

Weitere Vorteile des erfindungsgemäßen Polsterkissens sind darin zu sehen, daß man die Erhebungen nach Anbringen des Bezuges nicht mehr sieht und daß auch im belasteten Zustand infolge der zwischen den Erhebungen vorhandenen Freiräume eine erhebliche Verbesserung des klimatischen Sitzkomforts gegeben ist.

In einer Zeichnung ist das erfindungsgemäße Polsterkissen am Beispiel eines Automobilsitzes

dargestellt und nachstehend näher erläutert. Es zeigen :

Fig. 1 das Kissen in der Draufsicht und

Fig. 2 das Kissen im Schnitt gemäß Linie A-B in Fig. 1.

Das Polsterkissen 1 weist Seitenverstärkungen 2 auf, zwischen denen sich die eigentliche Sitzfläche 3 erstreckt. Diese Sitzfläche 3 ist mit drei Gruppen 4, 5, 6 von zylinderstumpfartigen Erhebungen 7 unterschiedlicher Größe und Höhe bedeckt. Die Geometrie dieser Erhebungen 7 ist gemäß den einzelnen Gruppen 4, 5, 6 auf die jeweils aufzunehmende Beanspruchung abgestimmt. Die Höhe der Erhebungen 7 ist im Verhältnis zur Höhe des eigentlichen Polsterkissens 1 gering.

Anspruch (für die Vertragsstaaten : BE, FR, GB, IT, NL, SE)

Polsterkissen aus Kunststoff für Sitzmöbel und Fahrzeugsitze, dessen Belastungsfläche Erhebungen (7) unterschiedlicher Geometrie aufweist, zwischen denen Freiräume vorhanden sind, wobei die Erhebungen (7) mit einer ihnen gemeinsamen Tragplatte (1) aus gleichem Material ein Stück bilden, dadurch gekennzeichnet, daß das Material formverschäumt ist ; daß die Tragplatte (1) das eigentliche Polsterkissen darstellt ; daß die Höhe der Erhebungen (7) im Verhältnis zur Höhe dieses Polsterkissens (1) gering ist und daß die Verteilung der Erhebungen (7) unterschiedlicher Geometrie den unterschiedlichen Belastungszonen (4, 5, 6) des Polsterkissens entspricht.

Anspruch (für den Vertragsstaat DE)

Verwendung eines formverschäumten Polsterkissens, dessen Belastungsfläche angeformte Erhebungen (7) unterschiedlicher Geometrie aufweist, zwischen denen Freiräume vorhanden sind, wobei diese Erhebungen (7) mit dem eigentlichen Polsterkissen (1) ein Stück bilden und die Höhe der Erhebungen (7) im Verhältnis zur Höhe des eigentlichen Polsterkissens (1) gering ist und die Verteilung der Erhebungen (7) bezüglich ihrer unterschiedlichen Geometrie den unterschiedlichen Belastungszonen (4, 5, 6) des Polsterkissens (1) entspricht, für Fahrzeugsitze.

Claim (for the contracting States : BE, FR, GB, IT, NL, SE)

Cushion pad of plastics materials for seat furniture and vehicle seats, of which the stress-bearing surface has elevations (7) of differing geometry, between which free spaces are present, wherein the elevations (7) form one piece with a common supporting slab (1) of the same material, characterised in that the material is foamed in a mould ; in that the supporting slab (1) represents the actual cushion pad ; in that the height of the elevations (7) is small in relation to the height of this cushion pad (1) and in that the distribution of the elevations (7) of differing geometry corresponds to the differing areas of stress (4, 5, 6) of the cushion pad.

Claim (for the contracting State DE)

Use of a cushion pad formed in a mould, of which the stress-bearing surface has elevations (7) of differing geometry moulded on to it, between which elevations free spaces are present, wherein these elevations (7) form one piece with the actual cushion pad (1) and the height of the elevations (7) is small in relation to the height of the actual cushion pad (1) and the distribution of the elevations (7) with respect to their differing geometry corresponds to the differing areas of stress (4, 5, 6) of the cushion pad (1), for vehicle seats.

Revendication (pour les Etats contractants : BE, FR, GB, IT, NL, SE)

Coussin en matière plastique pour sièges de mobilier ou de voiture, dont la surface de charge présente des saillies (7) de géométrie différente, entre lesquelles se trouvent des espaces libres et qui forment une seule pièce avec l'assise (1) commune réalisée dans le même matériau, ledit coussin étant caractérisé en ce que le matériau est moulé par expansion ; l'assise (1) constitue le coussin proprement dit ; la hauteur des saillies (7) est faible par rapport à celle du coussin (1) ; et la répartition des saillies (7) de géométrie différente correspond aux diverses zones de charge (4, 5, 6) du coussin.

Revendication (pour l'Etat contractant DE)

Utilisation d'un coussin en matière plastique moulé par expansion dont la surface de charge présente des saillies (7) de géométrie différente, entre lesquelles se trouvent des espaces libres et qui forment une seule pièce avec l'assise (1) commune réalisée dans le même matériau, la hauteur des saillies (7) est faible par rapport à celle du coussin (1) ; et la répartition des saillies (7) de géométrie différente correspond aux diverses zones de charge (4, 5, 6) du coussin, pour sièges de voiture.

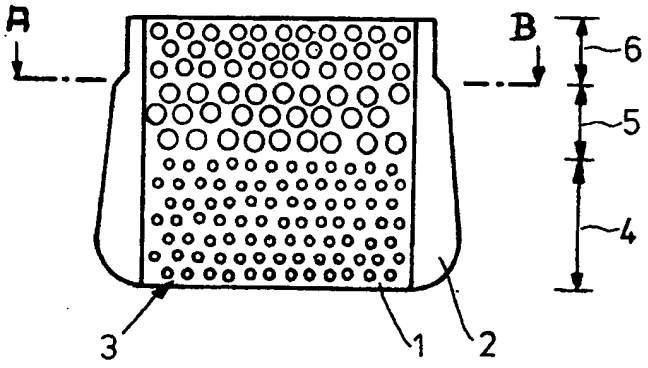

FIG. 1

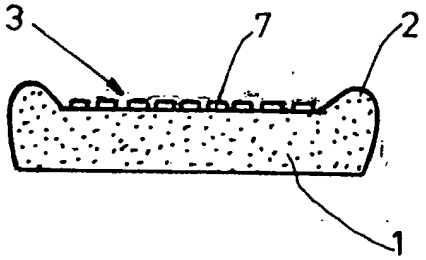

FIG. 2

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(71) Applicant (*for all destination countries except US*): PROTONED B.V. (NL/NL); Assumburg 73, NL-1081 GB Amsterdam (NL)

(72) Inventor; and
(75) Inventor/Applicant (*only for US*): BRÄUNING, Egon (DE/DE); Freiburgerstrasse 66, D-79576 Weil am Rhein (DE).

(74) Attorney: ULLRICH, Gerhard; A. Braun Braun Héretier Eschmann AG, Holbeinstrasse 36-38, CH-4051 Basel (CH).

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[(54) Title and (57) Abstract are in German and English translation, not reproduced here]

Chair Mechanism

Applicability of the Invention

The invention concerns a chair mechanism, specifically for a rotating office chair with a pneumatic spring for the adjustment of the height of the seat; the spring is vertically integrated into the undercarriage. The chair mechanism causes a synchronized lowering of the chair seat when the user initiates a change of position by a backward reclining of the seatback.

State of the Arts

Intellectual workers spend most of their working hours in a seated position. The hunched-over typing position for several hours at a computer terminal leads to significant stress of the bone structure, the muscles and the tissues of the back and neck. This has led to numerous attempts to improve the geometry of chairs and their mechanism in order to provide more effective support at each seated position. A significant improvement was achieved with synchronized mechanisms, where the seat adjusts in a synchronized fashion to adjustments of the seatback by means of linkages and joints, leading to an ergonomically appropriate position of the seat for each reclining position of the seatback. Such a synchronized mechanism is described in CH-A-629 945. This mechanism enables the user to make an adjustment from an upright working position by repositioning the body weight to the rear and by pressure against the attenuated spring of the seatback to a reclining relaxed position, such as for a lengthy telephone conversation. The seat follows the reclining seatback, so that the user achieves a reclining restful position. These chairs permit an easy and frequent change to a relaxed user position.

However, office work generally is not performed in a relaxed reclined position, but it requires a forward hunched-over position in order to maintain contact with the materials displayed on the worktable. In order to reduce the pressure of the seat against the lower leg and to induce the user to straighten his spine, mechanisms have been proposed where the front of the seat declines by a shift in weight in a forward hunched-over position. Attempts were also made to prevent an unhealthy backwards rotation of the pelvis and a curved back by means of shaping the seatback with a lumbar support and the usually simultaneous lifting of the rear of the seat. However, the seatback will support only if the user sits squarely in the chair and has full contact with the seatback. In the real world, there is no support of the back, because most users sit close to the front edge of the chair. Consequently, EP-B-0 592 369 proposed a synchronized mechanism, where the front of the seat lowers in a forward and upright seated position and slides to a reclined relaxed position, if the user shifts position.

The incorporated springs are of critical significance for the function of the chair mechanism. Pneumatic pressure springs are often used to achieve a synchronized movement between seatback and seat, where the springs are often linked to coil pressure springs (such as CH-A-629 945). However, pneumatic pressure springs have several disadvantages; they significantly increase the cost for the entire chair and need to be

coupled with mechanical springs to achieve optimal movement, which further increases costs and complicates assembly. Furthermore, pneumatic pressure springs have only a limited useful life due to the wear and tear on the gaskets. Thus, WO-A-92 / 03072 proposed to use a mechanical spring in the shape of a torsion bar to achieve the synchronized movement.

WO-A-93 / 25121 proposed the use of a rubber spring with an internal steel core and an external steel shell, where the internal steel core is stressed by torsion. The use of such a rubber spring yields an insufficient stiffness in the normal position of the chair, leading to insufficient stability of this position. The proposed positioning of the torsion axles, i.e. a centrally pivoting suspension of the seat shell and the attachment of the seat shell in the rear, cannot generate an improvement.

Goal of the Invention

The steady increase in computer terminal workstations requires a more upright-seated position with constant stress of the neck to observe the events on the computer screen. Consequently, many workers are faced with a change of their work position and the resulting changes in requirements for the mechanism of a chair to optimize its kinetic behavior. The previous synchronization mechanisms are useful for users, whose work assignments allow for frequent adjustments of positions, specifically between forward, upright and reclined positions. However, the known designs are not optimal for continuous seating at computer terminal workstations.

Thus, the invention has the goal of making a mechanism available, which can provide a steady work position with a wide angle of opening between seat and seatback for a reclined position that is largely stress-free. The forward seated position needs to allow for effective support of the lumbar area, while a reclined position is intended to allow for relaxed seating with some lowering of the seat, without requiring substantial changes of the viewing angle. At the same time, the mechanism and the entire chair structure need to allow for a certain amount of movement for the user in the chair and to provide for noticeable support of the shoulder. The height of the seat and the seatback needs to be adjustable. In addition, it is desired that the depth of the seat, the intensity of the lumbar support, and the neck support all be adjustable. The production of the chair is intended to be efficient and low-cost. Finally, the production methods need to enable use of a design that satisfies esthetic needs as defined by current preferences.

Summary of the Invention

The chair mechanism rests on an undercarriage placed on the floor, usually involving a normed five-armed star foot, and on a vertical pneumatic spring with a telescopically extendable piston shaft to adjust the height of the seat. The seat and the bottom of the seat frame are attached to the piston shaft as a single unit. The horizontal main rotation axis with the attached torsion spring, preferably a rubber spring, extends through the seat frame. The seat back frame, which can be rotated around the main rotation axis against the resistance of the torsion spring, is attached to the torsion spring. The chair also

contains a seat shell intended to hold a seat cushion with the possible addition of an intermediate cushion layer. The seat shell is connected to the seat back frame on a horizontal rear rotation axis and also to a joint on a horizontal front axis. The joint is connected to the seat frame on a horizontally fixed rotation axis. The seat back frame and the seat shell move in a synchronized fashion between a vertical position and a reclining position.

The core of the invention consists of an additional mechanical spring, which is attached parallel to the torsion spring and which has a cumulative effect to the resistance of the torsion spring. The parallel spring is preferably a coil spring, which may be separated into two symmetrically attached components. The positioning of the rotation axes, all of which are located underneath the seat shell, is critical for the properties of the mechanics. The front rotation axis, which connects the seat shell and the joint, is intended to be close to the front of the seat shell, where the front rotation axis rotates around the fixed rotation axis, which connects the joint and the seat frame, in radius and dividing circle. The rear rotation axis, which connects the seat shell and the seat back frame, is close to the rear of the seat shell, where the rear rotation axis rotates around the main rotation axis in radius and dividing circle. The main rotation axis is located between and below the front and the rear rotation axes.

Preferably, the fixed rotation axis should be above the plane of the main rotation axis and the front rotation axis should be roughly directly above the fixed rotation axis in the vertical position. In the maximum reclining position, it should be possible to lower the rear rotation axis to at least the vicinity of the level of the main rotation axis. In the vertical position of the chair, the front rotation axis is in front of the fixed rotation axis relative to the main rotation axis. Starting from this chair position, the horizontal distance between the fixed rotation axis and the main rotation axis and the distance between the main rotation axis and the rear rotation axis should have a relationship of roughly 1:2. The seat shell assumes a decline of about 15° in the maximum reclining position.

The essentially traditional torsion spring consists of an inner steel core, the rubber layer, which is firmly attached to the steel core, and the outer steel shell, which is firmly attached to the rubber layer. There is a multisided channel through the center of the steel core, which is on the main rotation axis; a matching multisided rod is inserted through the channel. The ends of the multisided rod are inserted into multisided openings in the free ends of two forked supports of the seat back frame. An adjustable tie element is attached to the outer steel shell of the torsion spring to adjust its tension.

The parallel spring is located on the front rotation axis and is coiled with one end against the bottom of the seat, while the other end of the coil spring is attached to a compression pin. The compression pin is on the front rotation axis, is firmly imbedded in the joint and may rotate in the front links of the joint on the underside of the seat shell. There are two each of the joint, compression pin, coil spring and the paired joint links, which are attached symmetrically on either side of the torsion spring.

The seat back frame has a bearing plate between its two support arms below the seat, which is traversed by the rear rotation axis, and to which the rear joint links on the underside of the seat are attached by an axle shaft. The two support arms join above the seat to a U-shaped member, which supports the rear cushion in such a way that the rear cushion is adjustable in height. The seat back consists initially of the core shell body with an internal main rotation axis for the torsion spring. The attachment flange, with a conical hole on its vertical axis, is attached to the rear of the shell body so it may be pushed onto the piston shaft of the pneumatic spring. The bearing flange is attached to the front of the shell body. This is traversed by a channel parallel to the main rotation axis and on the fixed rotation axis, which is intended to house an axle shaft inserted through joints on either side of the bearing flange. The shell body has an indentation to attach the tie element on the outer steel shell of the torsion spring.

The seat back consists initially of the lower support boom for insertion into the channel on the seat back frame and a center boom, which extends upwards from the support boom. Two symmetrical lumbar extensions, which form a horizontal arc between the support boom and the center boom, serve as supports for a flexible seat back shell. Two Y-shaped support arms extend from the top of the center boom. The free ends of the lumbar extensions have predrilled holes to attach the seat back shell, while the ends of the support arms are inserted into pockets in the seat back shell. It is possible to attach a headrest, the incline of which can be adjusted, to the rear support. The tension of the seat back shell in the lumbar region can be adjusted in a variable manner by means of eccentrics in the lumbar extensions. The seat back shell is fully covered by a seat cover on the user's side, but it is only partially covered in the backside; the cover is held in place by a formed pocket and quick-release connectors. The headrest is adjustable to a desired incline angle and height.

The essential advantages of the chair mechanism of the invention lie in the large opening angle between seat shell and seat back in the reclining position, in the adjustable reaction of the chair to weight movement by the user, and the soft and flexible seat, which allows the relaxing reclined position to become a permanent work position. The adjustable lumbar support, the variable height of the seat back and the adjustable angle of the headrest produce a high degree of seating comfort, which is particularly desirable when working with a keyboard and a computer terminal workstation. When reclining, the front edge of the seat shell lowers and the whole seat drops down significantly. Consequently, the user has an optimal seat depth for his body with effective support for his back and shoulders, without losing visual contact with his computer screen and with no stress on his neck muscles. The preferably net-like cover of the seat back – potentially also of the head cushion and the arm supports – generates a pleasant seating and decorative effect.

Short Description of the included Drawings

The figures are:

Fig. 1A: The chair according to the invention in its entirety in a vertical position as a side view;

Fig. 1B: The chair of Fig. 1A in a rear view;

Fig. 1C: The chair of Fig. 1A as an exploded view in assembly units with arm support;

Fig. 2A: An exploded view of the seat back frame, the seat back and the headrest;

Fig. 2B: The seat back frame and the seat back of Fig. 2A with a covered seat back shell;

Fig. 3A: The arrangement under the seat shell on the pneumatic height spring with the seat back frame;

Fig. 3B: The arrangement of Fig. 3A in an exploded view;

Fig. 3C: The assembly of seat back frame, seat shell, and rubber spring in position on the pneumatic height spring as a cross section in a vertical position;

Fig. 3D: The assembly of Fig. 3C in a perspective side view;

Fig. 4: The rubber spring with the shell of Fig. 3A in an exploded view;

Fig. 5: The assembly of Fig. 3C as it moves from the assembly position through the vertical position to the reclined position;

Fig. 6A to 6D: How the seat changes as it is lowered;

Fig. 6A: A cross section of Fig. 3A along the line A-A with a locked adjustment lever;

Fig. 6B: The view of Fig. 6A with a released adjustment lever;

Fig. 6C: A cross section of Fig. 3A along the line B-B, where the seat is pulled fully forward and the adjustment lever is locked;

Fig. 6D: The view of Fig. 6C, where the seat is pulled fully to the rear and the adjustment lever is unlocked.

Embodiment Example

The following provides a detailed description of an example of an embodiment of the chair mechanism according to the invention, with reference to the attached figures.

The following statement applies throughout the remaining discussion: If a figure contains reference numbers shown for reasons of non-ambiguity, but these reference numbers are not discussed in the directly related text, then these numbers are discussed in the previous or later descriptions of the figures. These numbers will not be explained

again, to maintain clarity of the discussion, if there is no ambiguity from the drawing that these numbers refer to "returning" components.

Figures 1A and 1B

The entire chair contains two levels, the essentially well-known undercarriage U and the seat S placed on undercarriage U, where the seat S, which represents the invention, is placed on the undercarriage U. The undercarriage U consists of a typical five-armed star foot 1 with coasters 11, which touch the floor at the end of arms 10. The center of star foot 1 includes a housing 12, into which a pneumatic spring 13 is inserted vertically. A telescopically extendable piston shaft 14 extends from the pneumatic spring 13 on an axis A, upon which the seat frame 2, which forms the base of the entire seat S, is placed. Seat S may be rotated around axis A and may be adjusted in height by retraction or extension of piston shaft 14 along axis A.

The seat frame 2 consists of a core shell body 20, an attachment flange 21 extending towards the rear and a bearing flange 22 towards the front. The horizontal main rotation axis A1 with a conventional rubber spring 3 extends through the shell body 20. The vertical axis A extends through the attachment flange 21, and the rotation axis A2, which is parallel to the main rotation axis A1, extends through the bearing flange 22. The chair also includes a seat back frame 4, a seat back support 5, a headrest 6, a seat back shell 7, a seat shell 8 and the optional armrests, which are not shown here. A cushion holder 80 is attached to the seat shell 8 for the direct support of seat cushion 801. The seat frame 2 and the included rubber spring 3 are located underneath the seat shell 8, where the main rotation axis A1 is placed essentially parallel to the front edge 810 of seat shell 8.

The seat back frame 4, which is attached with its forked supports 40 on both sides of rubber spring 3 and which extends in a bent form from below seat shell 8 at some distance to the rear edge 811 of seat shell 8 upwards, is attached to the main rotation axis A1. The supports 40 combine above the level of seat shell 8 to a member 41, which supports the seat back support 5, the height of which can be adjusted, and its support boom 50. The chosen height will be fixed by means of a setscrew 42, which extends through member 41 of seat back frame 4. Two lumbar extensions 51, which form a symmetrical, roughly horizontal arc above the support boom 50, are attached at their outer ends to the seat back shell 7 in its lower lumbar area 70. The lumbar extensions 51 extend around the lumbar area 70 of seat back shell 7, where it is feasible to include vertical expansion slits to increase the elasticity of seat back shell 7 in its lower lumbar area 70. The seat back support 5 forms a Y-shape above the lumbar extensions 51, with a center boom 52 and two wing-like supports 53, the ends of which are inserted into pockets 710, which are located in the upper corners of the rear side of seat back shell 7. The vertical support 60 of headrest 6 is attached at the location, where the supports 53 branch off the support boom 52. A head cushion 61 pointed towards the rear of the user's head is attached to vertical support 60, where the incline of vertical support 60 is adjustable.

There are two pairs of joints 820, 821 in pairs below seat shell 8 near the front edge 810 and near the rear edge 811. Joints 9 are attached on the rotation axis A2 of bearing flange 22 of seat frame 2, which attach to the front joints 820 on the horizontal rotation axis A3. Each of the rear joints 821, which are close to the rear edge 811 of seat shell 8, is connected to one of the supports 40 of seat back frame 4 on the horizontal rotation axis A4. Whenever the seat back frame 4 and the seat back support 5 are pushed backwards, the seat shell 8 is lowered and moved to the rear in a synchronized manner.

A cover 73, which has a pocket 730 that is open to the upper rear, is intended to cover the seat back shell 7. This pocket 730 covers the lower edge 72 of seat back shell 7 up to roughly the lumbar area 70. The cover 73 completely covers the front of seat back shell 7, and it contains a top portion 731 intended for wrapping around the top edge 71 as well as two lateral portions 732 for wrapping around both sides of seat back shell 7. There are recesses 733 between the top portion 731 and the two lateral portions 732, so that the pockets 710 of seat back shell 7 are accessible even when the cover 73 is in place, so that the ends 530 of supports 53 can be inserted. A quick-release connection 734, such as a hook or Velcro connection, is intended to connect the top portion 731 and the respective adjoining lateral portion 732 underneath the supports 53. The lateral portions 732 likewise do not cover the ends of the lumbar extensions 51, which are connected to the seat back shell 7, which means that the center of the rear of seat back shell 7 is not covered. The quick-release connections 734 allow for quick mounting of cover 73 onto the seat back shell 7 during assembly or for quick removal for cleaning or replacement.

Figure 1C

The figure shows the undercarriage U with the star foot 1 and the vertically and centrally inserted pneumatic spring 13 for height adjustment of seat S, separated into major units. Seat S is shown to include seat shell 8, below which the essential components of the chair mechanism are located, and the connection to the vertical seat back frame 4. The cushion holder 80 lies on top of seat shell 8 and, in turn, supports the seat cushion 801 and its cover 802. The figure also shows seat back shell 7 and headrest 6 with head cushion 61 and vertical support 60, which connects to seat back support 5. It is practical and esthetically pleasant to cover head cushion 61 with a quick-release cover 610; this is optically particularly effective, if the cover is a net, for example.

The chair may be finalized by armrests 65 along its sides with rounded supports 66, which are preferably mounted below the seat shell 8 as well. Support 66 will have an adjustment mechanism 67 on its upper end to adjust the height and the incline of the inserted arm supports 68. The arm support 68 includes the vertical support 69, which is inserted into the adjustment mechanism 67, a support shell 680 and the covering cushion 681. This cushion 681 is preferably covered by a cover 682, such as another net.

Figure 2A

A box-like bearing housing 43, which is open on its top, is affixed between the two supports 40, which attach below the member 41 on the seat back frame 4, where its two

sides 430, which adjoin the supports 40, have two holes 431, which are in line with rotation axis A4. The front and rear walls 432, 433 extend between the two sides 430. The rear joints 821 from seat shell 8 are inserted into the bearing housing 43. An axle 44 is inserted through the holes 431 of bearing housing 43 and the matching holes of joints 821, such that the seat shell 8 is attached to the seat back frame 4 with rotation around axis A4. Axle 44 is held in place by, for example, screws 440, which are screwed against the sides 430.

The front wall 432 faces the free ends of supports 40, which are traversed by the main rotation axis A1, whereas the rear wall 433 is across from the front wall 432 and faces the member 41 of seat back frame 4. An indentation 435 is made in the top of rear wall 433, which contains a compression wedge 45 (see Fig. 3B), with a function to be explained below. The free ends of supports 40 have multisided holes 401 oriented along the main rotation axis A1, where a multisided rod 46 is inserted through both multisided holes 401 and rubber spring 3, such that rod 46 cannot turn. Rod 46 is held in place by screws 460, which are screwed against the supports 40.

The setscrew 42 is inserted through a hole 410 in the U-shaped member 41, which is open towards the seat S and a matching vertically elongated slot 500 in support boom 50 of seat back support 5. Thus, the height of seat back support 5 can be adjusted within slot 500. The lumbar extensions 51, which extend to both sides of seat back support 5, have holes 510 on their free ends. The lumbar extensions 51 have two eccentrics 55, which include a rotating knob 550, a cylinder 551 to be inserted into holes 510, and an eccentric compression pin through cylinder 551. Turns of the eccentrics 55 will modify the distance between the two compression pins and will thus adjust the tension in the lumbar area 70 of seat back shell 7. Reduced tension means that the user will perceive a more elastic lumbar area 70 of seat back shell 7. The compression pins are inserted into seat back shell 7, such that seat back support 5 and seat back shell 7 are firmly connected.

A screw hole 520, which serves to hold headrest 6, is located in the middle of boom 52 of seat back support 5 in the area where the supports 53 branch off. The free ends 530 of supports 53 may also have holes to insert screws for fastening to seat back shell 7. However, it is advantageous, if the ends 530 are inserted into pockets 710, which are found in the upper corners of the rear of seat back shell 7.

Figure 2B

The seat back shell 7 is covered by a quick-release and decorative cover 73, such as a net, for better ventilation. Given the tension of cover 73, it does not touch the surface of seat back shell 7 in the center of concave seat back shell 7, when viewed from the user's side, absent some pressure. Thus, as long as the user does not exert pressure, cover 73 does not rest on seat back shell 7. Consequently, both the seat back shell 7 and the cover 73 can breathe and can release absorbed moisture. This also generates a pleasing optical effect. The sides 430 of bearing housing 43 have a shelf-like contour, such that support 66, which is supported in this spot, can provide particularly firm support for armrest 65 by direct contact.

Figures 3A and 3B as well as 6A to 6D

This pair of figures serves only to illustrate the structure of the chair mechanism and, in the case of the set of Fig. 6A to 6D, to describe the adjustment mechanism for the depth of the seat. The seat shell 8 includes a twice-angled lever 803 with a handle 804 that extends to the side for actuation by the user; this lever has a plate-like latch 805, which rests in a recess 812 of seat shell 8. A spring 806 below latch 805 pushes against the seat shell 8 and thus presses latch 805 with some compression upwards. Three normally upward pointing protuberances 807 on the surface of latch 805 push into a matching set of holes 800 above cushion holder 80 (see Fig. 6A to 6D). Movement of lever 803 pulls the protuberances 807 from the holes 800, so that cushion holder 80 may be pushed from a maximum forward position (see Fig. 6C) to a maximum backward position (see Fig. 6D). The range may include, for example, 50 mm in 5 steps of 10 mm each.

The seat shell 8 has edges 814, which extend beyond the sides and which are unencumbered from below; these edges are gripped from below by angled claws 808, so that cushion holder 80 is held in place at the level of the seat on seat shell 8. The cushion holder 80 has a contact edge 809 in the forward area of its underside, which is pushed against the front edge 810 of seat shell 8 in the maximum backward position of cushion holder 80. The maximum forward position is constrained by two stops 813, which are attached at some distance from each other on the upper side of seat shell 8 near its rear edge 811; when the cushion holder 80 is pulled fully forward, it is pulled against these stops (see Fig. 3A and 3B).

Figures 3C to 4

The seat shell 8, as shown in Fig. 3C and 3D, is a simplified version compared to Fig. 3A and 3B without the possibility of adjusting the depth of the seat. Rubber spring 3 is shaped like a roll with three layers. The innermost steel core 30 has a multisided channel 300, which may be hexagonal, for the formfitting insertion of a rod 46 in line with the main rotation axis A1. Both ends of rod 46, which is encased in rubber spring 3, are kept from rotating by insertion into multisided holes 401 in the free ends of supports 40. A rubber layer 31 is applied onto the steel core 30, which in turn is surrounded by an outer steel shell 32. Pins 320 extend from the steel shell 32 into the rubber layer 31. This rubber spring 3 is housed in the core shell body 20 of seat frame 2, where slip rings 33, which may be made of plastic, for example, may be inserted to reduce friction between the interior wall of core shell body 20 and the steel shell 32. The attachment flange 21, which extends towards the rear of seat frame 2, has a conical hole 210 along axis A, into which the upper end of piston shaft 14 extending from the pneumatic spring 13 is inserted. The valve stem 15 extends from piston shaft 14 along axis A; this valve controls the retraction or extension of piston shaft 14, depending on how much weight is placed on seat S. Valve stem 15 is operated in a traditional manner by a shift lever, which is not shown here, but which is normally included below seat shell 8.

A bearing flange 22 is attached opposite the attachment flange 21 and in front of core shell body 20; this flange is pierced along axis A2 by opening 220. There is an indentation 200 in the core shell body 20 between the attachment flange 21 and the bearing flange 22 intended for the insertion of a tie element 23, which is attached to the outer steel shell 32 by, for example, a screw connector 230. The tie element 23 contains a tie rod 24, which extends through the bearing flange 22 and which is attached to a hand wheel 26; this wheel contacts bearing flange 22. Tightening hand wheel 26 pulls tie element 23 towards the bearing flange 22 and thus tightens the rubber spring 3.

The movable joints 9 are oriented along rotation axis A2 on both sides of bearing flange 22; they connect to rotation axis A3 and are connected there to the movable forward joints 820 on the underside of seat shell 8. The rear joints 821 on the underside of seat shell 8 connect along rotation axis A4 to bearing housing 43, which is attached between the supports 40 of seat back frame 4. Both ends of rod 46, which is encased in rubber spring 3, are kept from rotating by insertion into multisided holes 401 in the free ends of supports 40.

Seat shell 8 has an indentation 83, which consists of two segments 830, 831. The indentation segment 830 is open from above and is located in front of bearing housing 43, if viewed from the front edge 810 of seat shell 8. Indentation segment 831 is open from below and is directly adjacent to indentation segment 830 above bearing housing 43 between joints 821. Thus it is possible to insert a locking plate 84 into indentation segment 830, which is held in place by a spring 86 and is always partially pushed into indentation segment 831, so that locking plate 84 pushes the seat shell 8 against the front wall 432 of bearing housing 43 (Fig. 3C shows the unlocked position). This locks the vertical position of the chair. Even with strong pressure from the user against seat back support 5 or seat back frame 4, seat back frame 4 and the attached seat back support 5 will remain in an essentially vertical position. A return 85 on locking plate 84, which is moved by lever 87, can return locking plate 84 to the unlocked position shown in Fig. 3C, overcoming the resistance of spring 86. Only then can seat back frame 4 and seat back support 5 be moved to the rear to the reclining position. If the return 85 is pulled beyond a certain point, return locking plate 84 remains in the unlocked position, which implies that the seat back frame 4 remains movable. An excessive movement of seat back frame 4 around main rotation axis A1 with a complete release of seat S is prevented by compression wedge 45, which is inserted into indentation 435 on the rear wall 433 of bearing housing 43 and which presses against seat shell 8 from below.

Figure 3D also shows indentations on both sides of seat shell 8 close to the rear edge 811 for the armrests. In addition to the previously described two front joints 820 on the underside of seat shell 8, there are also two additional inner joints 822, which are also on rotation axis A3 close to seat frame 2, such that joints 820 are on the outside of joints 822, which face each other with a certain distance from the paired outer joint 820. Just outside the outer joint 820, a joint 9 with a joint segment 90 extended towards rotation axis A3 is attached on rotation axis A3 with a hole 900 along the line of rotation axis A3. Holes that match hole 900 along rotation axis A3 are drilled into joints 820, 822, so that a compression pin 88 is inserted as the axle along rotation axis A3, which extends from

joint segment 90, where the head 880 is firmly embedded, through the two connected joints 820, 822. Compression pin 88 has a cross slit 882 at the shaft end 881. A coil spring 89, which has a crimp 890 on one end extending through the central axis of the coil and a crimp 891 on the opposite end extending tangentially from the coil, is held on compression pin 88 between each pair of joints 820, 822. The tangential crimps 891 of both coil springs 89 each rest on the underside of seat shell 8, whereas the crimps 890 are inserted into the cross slits 882 of compression pins 88.

The action of rubber spring 3 thus adds to the action of the two coil springs 89. A user sitting on the chair, whose body weight presses against seat back frame 4 or seat back support 5 will be supported by the joint action of rubber spring 3 and coil springs 89, assuming locking plate 84 is pulled back, i.e. unlocked. Rubber spring 3 and coil springs 89 have a parallel action. Backwards movement of seat back frame 4 rotates rod 46 in the rubber spring against its increasing resistance and simultaneously moves seat shell 8 such that coil springs 89 are increasingly deformed with higher resistance. The spring resistance of the entire arrangement of coils springs 89 and rubber spring 3 can be adjusted to individual needs by rotation of hand wheel 26, which adjusts the position of tie element 23 and thus the tension of rubber spring 3.

Figure 5

Compression wedge 45 is not yet pushed into bearing housing 43 during assembly, which allows seat back frame 4 to be rotated forward, to a negative slope, around main rotation axis A1 in the direction of the front edge 810 of seat shell 8 into assembly position P_0. Seat shell 8 will make this movement by lowering in the area of front edge 810 and rising in the area of rear edge 811. The movement around the fixed rotation axis A2 lowers axis A3, while rotation around main rotation axis A1 raises axis A4. Rubber spring 3 and coil springs 89 can then be mounted in assembly position P_0, while they are not under tension. The relationship of the fixed axes A1 and A2 is such that rotation axis A2 is higher than the level of rotation axis A1. The maximum negative incline angle is reached when the upper edge of indentation 435 of bearing housing 43 contacts the underside of the seat shell 8 near the rear edge 811.

The insertion of compression wedge 45 moves the chair to the vertical position P_1, i.e. seat back support 5, which is mounted on seat back frame 4, is essentially vertical and seat shell 8 is essentially horizontal. Because they are fixed, the position of the main rotation axis A1 and the rotation axis A2 on the bearing flange 22 of seat frame 2 are unchanged. However, rubber spring 2 [sic; *Translator's note: should be 3*] and coil springs 89 are now under tension. The vertical position of seat back support 5 rotates seat back frame 4 around the main rotation axis A1, which lowers rotation axis A4. At the same time, joints 9 rotate around rotation axis A2 and joint segments 90 are roughly vertical, such that rotation axis A3 is now slightly higher essentially directly above rotation axis A2. Preferably, joint segments 90 are slightly inclined in the vertical position P_1, so that rotation axis A3 is slightly in front of rotation axis A2 in the direction of the main rotation axis A1. This allows the user to move to the reclining position P_2 by shifting his weight rather than by pressing against seat back support 5. It has also proven

to be preferable, if the rotation axis A4, which can rotate around the main rotation axis A1, is situated in the vertical position P_1 such that rotation axis A4, which is near the rear edge 811 of seat shell 8 is higher than main rotation axis A1 and rotation axis A2, but lower than rotation axis A3. A return to the assembly position P_0 with a negative incline is precluded, because the upper edge of the inserted compression wedge 45 pushes against the underside of seat shell 8 near the rear edge 811.

Given a sufficient shift of weight by the user, the retracted locking plate 84 allows the movement of the seat S into the reclining position P_2. Here the seat back frame 4 rotates around the main rotation axis A1, and the rotation axis A4 lowers as far as the level of the main rotation axis A1. Simultaneously, joints 9 rotate around rotation axis A2, such that joint segments 90 are inclined towards the main rotation axis A1 and rotation axis A3 approaches main rotation axis A1 horizontally as well as vertically, but remains higher than both rotation axes A1 and A2. The maximum incline of the seat S in the incline position P_2 is limited by the contact of seat shell 8 in the area of the lower indentation segment 831 with the front wall 432 of bearing housing 43, which acts as the support in the final position.

Patent Claims

1. Chair mechanism for a chair, which consists of an undercarriage (U) with a foot (1) that rests on the floor and an incorporated pneumatic spring (13) on a vertical axis (A) with a telescopically extendable piston shaft (14) to adjust the height of the chair and a seat (S) resting upon a seat frame (2), which is inserted onto the piston shaft (14), where:

a. a horizontal main rotation axis (A1) extends through the seat frame (2), with a mechanical torsion spring (3) connected to a seat back frame (4), which can rotate around the main rotation axis (A1) and which is constrained by the resistance of torsion spring (3);

b. a seat shell (8) for support of a seat cushion (801) is connected on one end to a horizontal rotation axis (A4) on the seat back frame (4) and on the other end on a horizontal rotation axis (A3) by a joint (9), which is connected on a horizontal rotation axis (A2) with a seat frame (2), where movement of the seat back frame (4) between a vertical position and a reclined position of the chair initiates a synchronized movement of seat shell (8), characterized by having

c. an additional mechanical spring (86) [sic; *Translator's note: should be 89*] parallel to the torsion spring (3) and with amplification of the resistance of torsion spring (3), and

d. where the rotation axes (A1 to A4) are positioned below the seat shell (8) as follows:

da. the front rotation axis (A3), as a connection between the seat shell (8) and the joint (9), close to the front edge (810) of seat shell (8), where the front rotation axis (A3) can rotate in radius and dividing circle around the fixed rotation axis (A2) as a connection between joint (9) and seat frame (2);

db. the rear rotation axis (A4), as a connection between the seat shell (8) and the seat back frame (4), close to the rear edge (811) of seat shell (8), where the rear rotation axis (A4) can rotate in radius and dividing circle around the fixed main rotation axis (A1); and

dc. the main rotation axis (A1) lies between and below the front and rear rotation axis (A3, A4).

2. Chair mechanism according to Claim 1, characterized by having

a. the fixed rotation axis (A2) above the level of main rotation axis (A1);

b. the front rotation axis (A3) essentially vertical above the fixed rotation axis (A2) in the vertical position of the chair; and

c. the rear rotation axis (A4) lowered relatively closely to the level of the main rotation axis (A1) in the maximum reclining position.

3. Chair mechanism according to Claim 1 or 2, characterized by having

a. the front rotation axis (A3) ahead of fixed rotation axis (A2) relative to the main rotation axis (A1) in the vertical position of the chair;

b. a ratio of 1:2, for example, between the horizontal distance from the fixed rotation axis (A2) to the main rotation axis (A1) and the horizontal distance from the main rotation axis (A1) to the rear rotation axis (A4); and

c. the seat shell (8) in an angle of more or less 15° from horizontal in the maximum recline position.

4. Chair mechanism according to Claim 1, characterized by having

a. a torsion spring (3) consisting of:

aa. an inner steel core (30),

ab. a rubber layer (31) firmly attached to the steel core (30), and

ac. an outer steel shell (32) firmly attached to the rubber layer (31); with

b. a multisided channel (300), which extends through the steel core (30) along the main rotation axis (A1) and into which a matching multisided rod (46) is inserted;

c. the rod (46) inserted at its outer ends into multisided holes (401) in the free ends of the forked supports (40) of seat back frame (4); and

d. an adjustable tie element (23) attached at the outer steel shell (32) for the adjustment of the tension of torsion spring (3).

5. Chair mechanism according to Claim 1, characterized by having

a. an additional mechanical spring (86) [sic] on the front rotation axis (A3), consisting of a coil spring (86) [sic] with one end (891) pushed against the seat shell (8), while the other end (890) of coil spring (86) [sic] is connected to a compression pin (88); and

b. a compression pin (88) in line with the front rotation axis (A3), which is firmly inserted into joint (9) and which can rotate within the front joints (820, 822), into which it is inserted; where

c. joint (9), compression pin (88), coil spring (86) [sic] and joints (820, 822) are each present twice, symmetrically arranged around the torsion spring (3).

6. Chair mechanism according to Claim 1 or 4, characterized by having the seat back frame (4)

a. with a bearing housing (43) between its two supports (40) below the seat shell (8), which is traversed by the rear rotation axis (A4), and which is connected to the rear joints (821) on the underside of seat shell (8) by an axle (44); and

b. the two supports (40) join above the seat shell (8) in a U-shaped member (41), which enables the height adjustment of seat back support (5).

7. Chair mechanism according to Claim 1 or 4, characterized by having the seat frame (2) consist of:

a. a core shell body (20) oriented along the main rotation axis (A1) to hold the torsion spring (3);

b. an attachment flange (21) behind the core shell body (20), with a conical hole (210) to insert the piston shaft (14) of pneumatic spring (13); and

c. a bearing flange (22) in front of the core shell body (20) with an opening (220) oriented along the fixed rotation axis (A2) and parallel to the main rotation axis (A1) for the insertion of an axle through joints (9) on both sides of bearing flange (22); where

d. the core shell body (20) has an indentation (200) on the outer steel shell (32) of torsion spring (3) to attach the tie element (23).

8. Chair mechanism according to Claim 6, characterized by having

a. the seat back support (5) consist of:

b. a lower support boom (50) for insertion into the member (41) on the seat back frame (4);

c. an upward center support boom (52) attached to support boom (50);

d. two symmetrical lumbar extensions (51), which extend in a horizontal arc between the lower support boom (50) and the center support boom (52) for the support of an elastic seat back shell (7); and

e. two supports (53), which extend upwards from the center support boom (52) in a Y-shape; where

f. the free ends of lumbar extensions (51) have holes (510) to be used for fastening the seat back shell (7);

g. the supports (53) have free ends (530) to be inserted into pockets (710), which are on the back of seat back shell (7), preferably in the upper corners; and

h. a headrest (6), which can be adjusted in incline and height, is attached to seat back support (5).

9. Chair mechanism according to Claim 8, characterized by having rotating eccentrics (55) inserted into holes (510) in the free ends of lumbar extensions (51) for the variable tensioning of seat back shell (7) in its lumbar region (70), where the eccentric compression pins are inserted into the seat back shell (7).

10. Chair mechanism according to Claim 9, characterized by having

a. eccentrics (55) with a knob (550) connected to a coaxial cylinder (551) intended for insertion into one of the holes (510);

b. eccentric compression pins, which extend through eccentrics (55); and

c. compression pins which also serve as lock screws inserted into the seat back shell (7).

11. Chair mechanism according to Claim 8, characterized by having

a. a seat back shell (7) of an elastic and flexible material;

b. the possibility for expansion slits in its lumbar area (70); and

c. which can be covered at least on the user side by a cover (73).

12. Chair mechanism according to Claim 11, characterized by having

a. a cover that is semitransparent, preferably as a net, and which covers the seat back shell (7) on the user side, where it does not closely attach to the surface of seat back shell (7) in the absence of pressure in order to improve the seat climate, and that it contains:

ba. a pocket (730), which is open towards the top to insert the lower portion of seat back shell (7);

bb. at the top a top portion (731) for wrapping around the top edge (71) of seat back shell (7);

bc. at each side, a lateral portion (732) for wrapping around the sides of seat back shell (7);

bd. a recess (733) between the top portion (731) and the lateral portions (732) on each side to allow for the insertion of two supports (53) attached to the seat back shell (7); and

be. quick-release connections between the top portions (731) and the lateral positions (732) below the supports (53).

13. Chair mechanism according to Claim 8, characterized by having

a. a headrest (6) consisting of a vertical support (60) and a head cushion (61);

b. a lock (62), which serves to fasten the vertical support (60) of headrest (6) on the seat back support (5); and

c. a head cushion (61) equipped with a semitransparent cover (610), preferably a net.

14. Chair mechanism according to Claim 1, characterized by having a locking plate (84), which is under pressure from a spring (86), in the seat shell (8) to lock the seat (S) in a vertical position (P_1).

15. Chair mechanism according to Claim 1, characterized by having an adjustment mechanism for the height of seat (S) with

a. a lever (803), which is held under tension by a spring (806), in the seat shell (8); and

b. protuberances (807) on lever (803) and a complementary set of holes (800) below the cushion holder (80), which are locked together, if not pushed, to block movement of cushion holder (80), but which can be separated by pressure against spring (806).

16. Chair mechanism according to Claim 15, characterized by having

a. a spring (806), which extends as a reed spring (806) from lever (803) and pushes against seat shell (8);

b. protuberances (807) that point upwards;

c. a set of holes (800) that enables an adjustment in several steps;

d. limits (809, 810, 813) to limit the maximum forward and backward position of cushion holder (80); and

e. contours (808, 814) below the cushion holder (80) and also along the edges of seat shell (8) to contain cushion holder (80) on seat shell (8).